

THE UNIVERSITY OF THE STATE OF NEW YORK

# GRADE 8

## INTERMEDIATE-LEVEL SCIENCE TEST

### WRITTEN TEST

JUNE 3, 2013

Student Name \_\_\_\_\_

School Name \_\_\_\_\_

**The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.**

Print your name and the name of your school on the lines above.

The questions on this test measure your knowledge and understanding of science. The test has two parts. Both parts are contained in this test booklet.

**Part I** consists of 45 multiple-choice questions. Record your answers to these questions on the separate answer sheet. Use only a No. 2 pencil on your answer sheet.

**Part II** consists of 40 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

You may use a calculator to answer the questions on the test if needed.

You will have two hours to answer the questions on this test.

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**



## Part I

### DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by three or four choices, numbered 1 through 4. Read each question carefully. Decide which choice is the best answer. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

Read the sample question below.

<p style="text-align: center;"><b>Sample Question</b></p> <p>Earth gets most of its light from</p> <ul style="list-style-type: none"><li>(1) the stars</li><li>(2) the Sun</li><li>(3) the Moon</li><li>(4) other planets</li></ul>
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The correct answer is **the Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

Answer all of the questions in Part I in the same way. Mark only one answer for each question. If you want to change an answer, be sure to erase your first mark completely. Then mark the answer you want.

You will not need scrap paper. You may use the pages of this test booklet to work out your answers to the questions.

You may use a calculator if needed.

When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

When you have finished Part I, go right on to Part II. Answer all of the questions in Part II.

**Part I**

1 A student is trying to determine if a certain beetle will help control the population of a harmful plant species. Which sequence of steps would be best suited for this investigation?

↓  
develop a question  
conduct an experiment  
state a hypothesis  
make conclusions  
analyze data

( 1 )

↓  
state a hypothesis  
make conclusions  
develop a question  
analyze data  
conduct an experiment

( 3 )

↓  
make conclusions  
conduct an experiment  
develop a question  
state a hypothesis  
analyze data

( 2 )

↓  
develop a question  
state a hypothesis  
conduct an experiment  
analyze data  
make conclusions

( 4 )

2 The data table below shows some data related to the Sun and the planets in our solar system.

**Data Table**

<b>Object</b>	<b>Average Distance from Sun (in million km)</b>	<b>Diameter (in thousand km)</b>
Sun	0	1392.0
Mercury	58	4.9
Venus	108	12.1
Earth	150	12.8
Mars	228	6.8
Jupiter	778	143.0
Saturn	1427	120.5
Uranus	2871	51.1
Neptune	4498	49.5

The distance between the Sun and Saturn is approximately six times the distance between the Sun and which other planet?

(1) Earth

(3) Mars

(2) Jupiter

(4) Venus

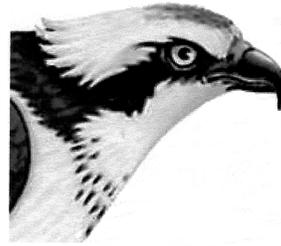
Base your answers to questions 3 and 4 on the bird head diagrams below and the dichotomous key that follows. The birds are labeled *A*, *B*, *C*, and *D*.



Bird A



Bird B



Bird C



Bird D

(Not drawn to scale)

**Dichotomous Key**

Step	Description
1a	beak longer than head..... go to 2
1b	beak shorter than head..... go to 3
2a	streaked feathers..... dunlin
2b	nonstreaked feathers..... black skimmer
3a	hooked beak..... go to 4
3b	nonhooked beak..... Baird's sparrow
4a	stripe on head..... osprey
4b	no stripe on head..... bald eagle

3 Based on the dichotomous key, which bird is a Baird's sparrow?

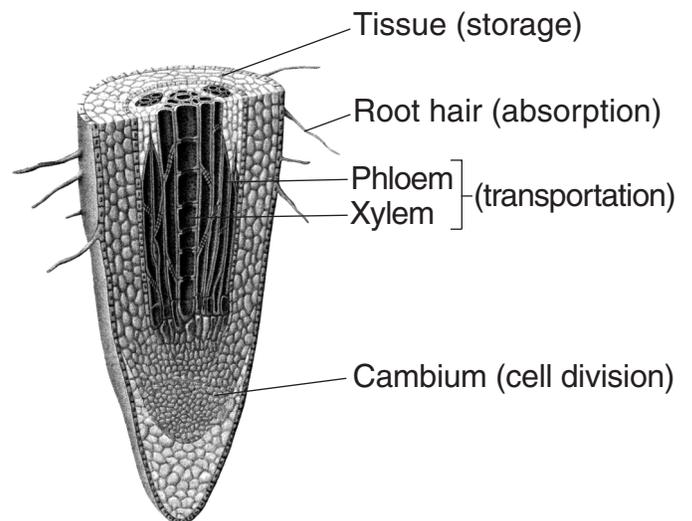
- (1) *A*
- (2) *B*
- (3) *C*
- (4) *D*

4 Which characteristic could best be used to distinguish between birds *B* and *C*?

- (1) beak shape
- (2) beak length
- (3) stripe on head
- (4) shape of eye

- 5 What eventually happens to a species when the environment changes and the organisms do *not* adapt?
- (1) classification                      (3) extinction  
(2) development                      (4) regulation
- 6 Which sequence represents the correct levels of organization for multicellular organisms?
- (1) cell → tissue → organ → organ system  
(2) tissue → organ → cell → organ system  
(3) organ system → organ → cell → tissue  
(4) cell → organ → tissue → organ system
- 7 In which part of a plant cell does photosynthesis occur?
- (1) nucleus                      (3) cell membrane  
(2) chloroplast                      (4) cell wall
- 8 Humans are protected from some infections by specialized cells which produce chemicals that
- (1) destroy microbes  
(2) recycle nutrients  
(3) allow locomotion  
(4) coordinate movement
- 9 Which human body systems work directly together to allow locomotion?
- (1) circulatory, excretory, and respiratory  
(2) circulatory, endocrine, and reproductive  
(3) skeletal, muscular, and nervous  
(4) skeletal, digestive, and respiratory
- 10 A dialysis machine can be used to remove waste from a patient's blood. Which human body system works in a similar way?
- (1) reproductive                      (3) digestive  
(2) excretory                      (4) endocrine
- 11 Which gas is transported by the circulatory system in humans and is used by cells during respiration to release energy stored in food?
- (1) carbon dioxide                      (3) hydrogen  
(2) nitrogen                      (4) oxygen

- 12 A cell's chromosomes contain
- (1) genes                      (3) sperm  
(2) chlorophyll                      (4) eggs
- 13 The human respiratory system is responsible for removing
- (1) fat from cells  
(2) carbon dioxide from blood  
(3) hormones from glands  
(4) nutrients from food
- 14 Which process is a cause of variation in a species?
- (1) metamorphosis  
(2) cellular respiration  
(3) sexual reproduction  
(4) regulation
- 15 The diagram below shows a magnified view of a cross section of a plant root tip. Four parts of the root and the process that each performs are shown.

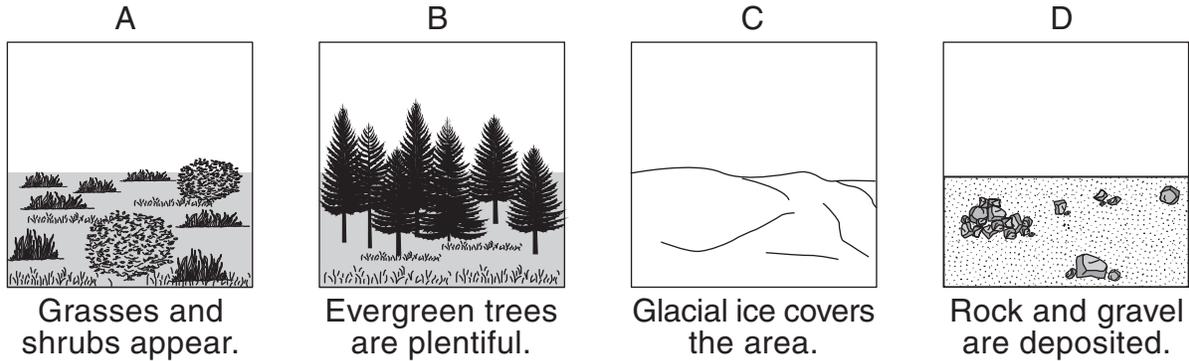


- Which process is directly responsible for root growth in plants?
- (1) storage                      (3) transportation  
(2) absorption                      (4) cell division

16 Which pathway do most nutrients take after a person takes a bite of food?

- (1) digestive system → circulatory system → body cells
- (2) circulatory system → body cells → digestive system
- (3) digestive system → body cells → circulatory system
- (4) circulatory system → digestive system → body cells

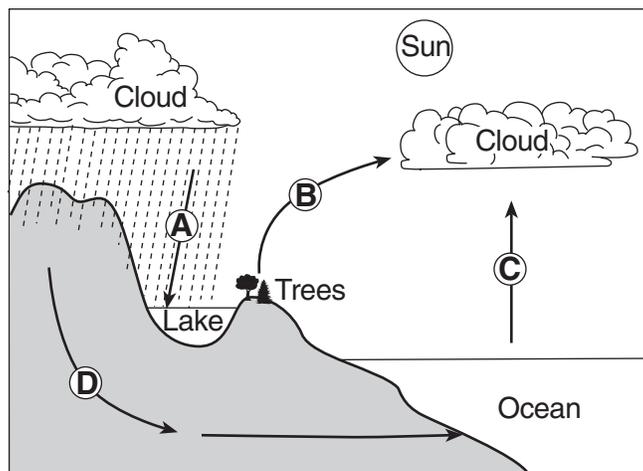
17 A glacier in Alaska has melted back a distance of 100 kilometers over the last 200 years. Four stages in this process are shown in diagrams A, B, C, and D below.



In which order should the diagrams be placed to represent the ecological succession that has taken place in the area?

- (1) C → D → A → B
- (2) C → D → B → A
- (3) D → C → B → A
- (4) D → C → A → B

18 In the diagram below, letters A, B, C, and D represent four different processes that occur during the water cycle.

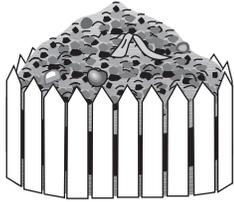


During which process is water released from land organisms into the atmosphere?

- (1) A
- (2) B
- (3) C
- (4) D

- 19 Abnormal cell division may result in
- (1) disease prevention
  - (2) tissue repair
  - (3) metamorphosis
  - (4) cancer

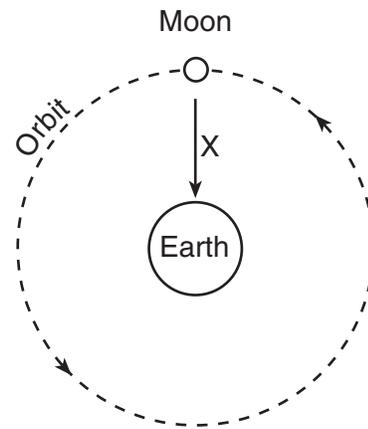
- 20 The diagram below represents a pile of decaying plant and animal materials. This process puts nutrients back in the soil.



The bacteria and fungi that break down the plant and animal materials are classified as

- (1) consumers
  - (2) decomposers
  - (3) predators
  - (4) producers
- 21 Herbivores obtain most of their energy by
- (1) consuming animals
  - (2) consuming plants
  - (3) producing sugar
  - (4) absorbing sunlight
- 22 A biological community is made up of all the
- (1) populations living in an area
  - (2) natural resources present in an area
  - (3) members of a species on Earth
  - (4) environments on Earth
- 23 If an ecosystem's balance is disturbed by a volcanic eruption, what will most likely occur?
- (1) The ecosystem will not change from its original state.
  - (2) The ecosystem will eventually become balanced again.
  - (3) The consumers in the ecosystem will begin to consume carbon dioxide.
  - (4) The consumers in the ecosystem will begin to produce more oxygen.

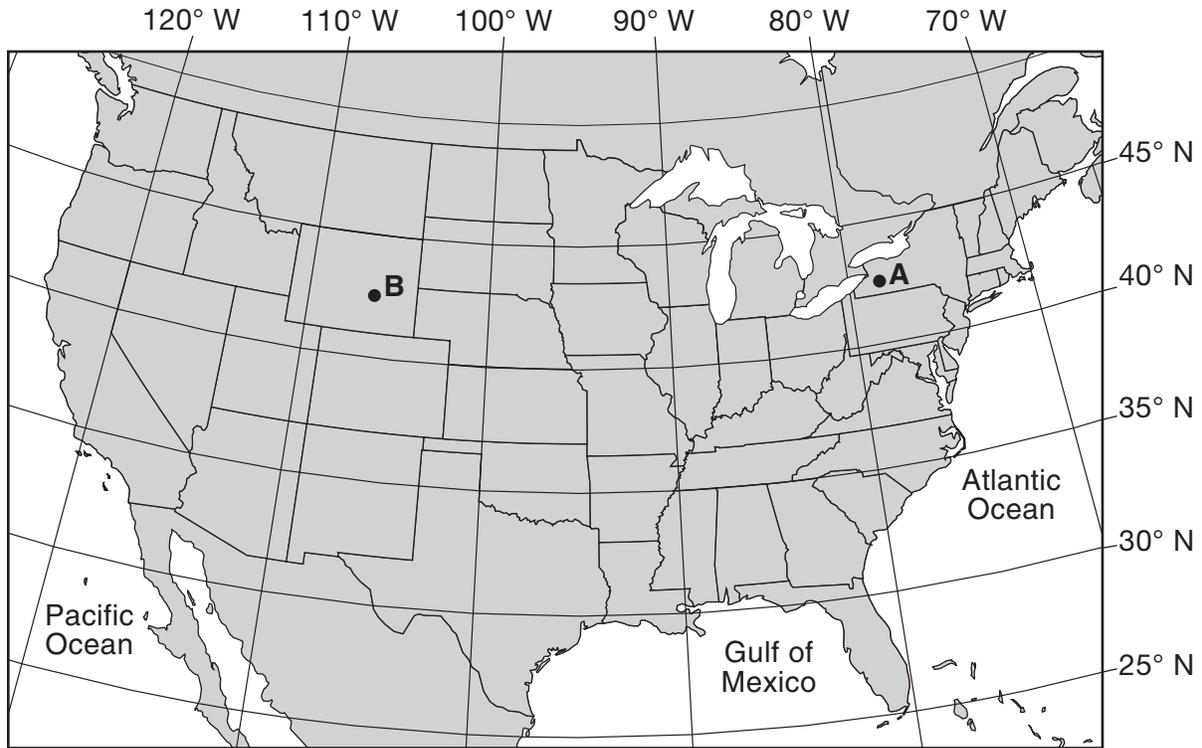
Base your answers to questions 24 and 25 on the diagram below and on your knowledge of science. The diagram represents the Moon and its orbit around Earth. The arrow labeled X represents the force that keeps the Moon in its orbit.



(Not drawn to scale)

- 24 Which force is represented by X?
- (1) gravity
  - (2) friction
  - (3) electricity
  - (4) magnetism
- 25 Approximately how long does it take for the Moon to complete one orbit around Earth?
- (1) 1 day
  - (2) 1 week
  - (3) 1 month
  - (4) 1 year
- 
- 26 The layered mixture of gases surrounding Earth is called the
- (1) atmosphere
  - (2) hydrosphere
  - (3) lithosphere
  - (4) hemisphere
- 27 Which geologic process occurs when the acid in precipitation dissolves certain types of rock?
- (1) faulting
  - (2) tilting
  - (3) weathering
  - (4) erupting

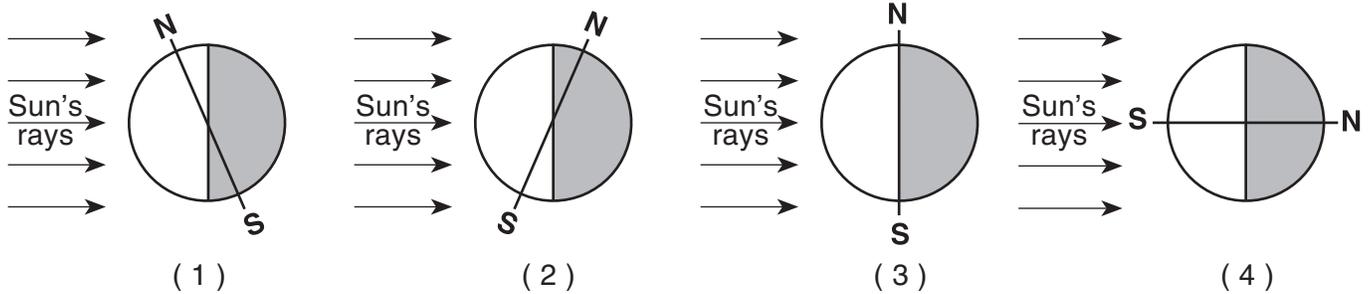
28 The map below shows latitude and longitude lines for a portion of North America. Points A and B represent two cities.



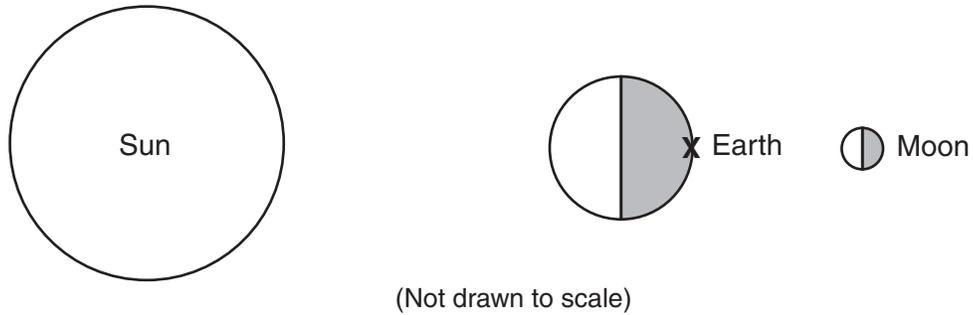
Compared to the location of city A, the location of city B is at

- (1) the same latitude, but a different longitude
- (2) the same latitude and same longitude
- (3) a different latitude and the same longitude
- (4) a different latitude and different longitude

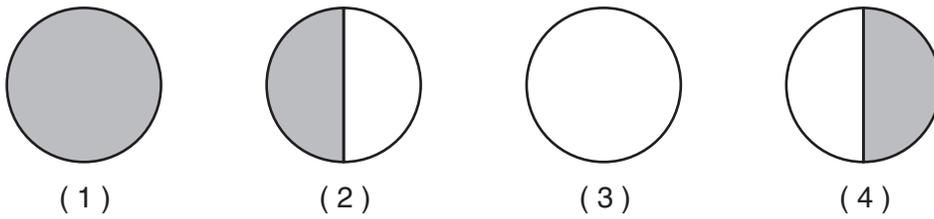
29 Which diagram best represents the tilt of Earth's axis in December?



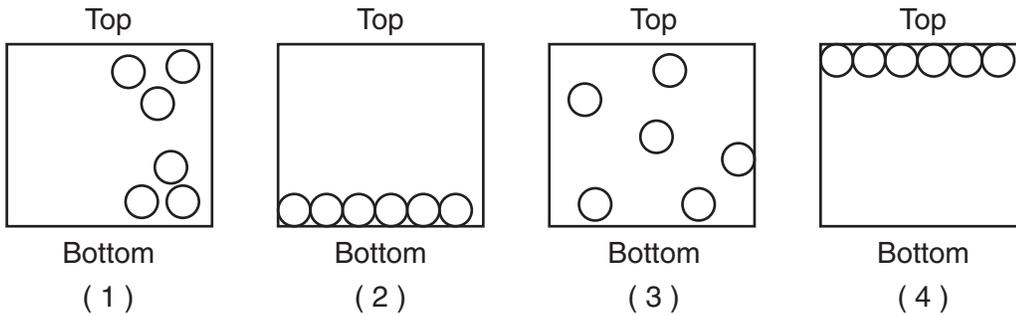
30 The diagram below represents the Sun, Earth, and the Moon as viewed from space. Letter X is a location on Earth's surface.



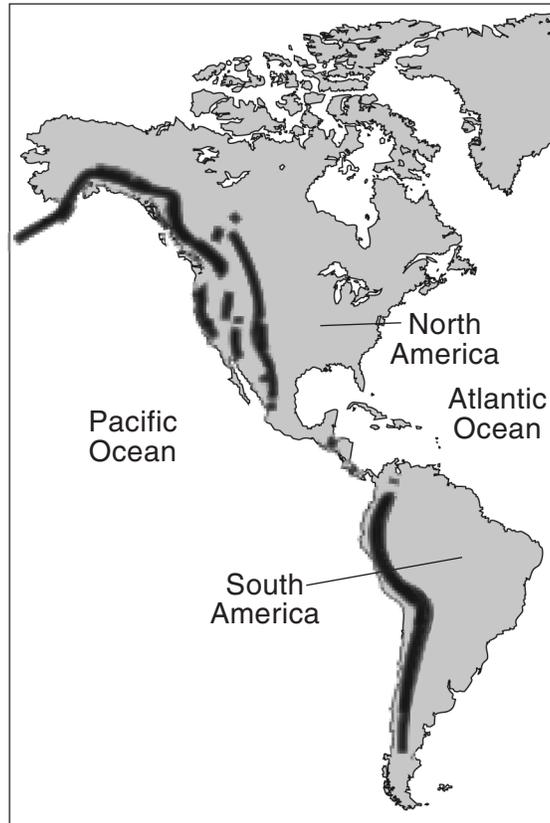
Which diagram best represents the phase of the Moon as viewed from X?



31 The top and bottom of each container below are labeled. Which model best represents the arrangement of gas molecules inside a sealed container as viewed from the side?



- 32 The map below shows dark bands that indicate long mountain ranges on the west coasts of North America and South America.



What caused the formation of these mountain ranges?

- (1) erosion of continental coastlines by ocean waves      (3) collision of lithospheric tectonic plates  
(2) deposition of river sediments entering the ocean      (4) uneven heating of Earth's surface
- 33 The photograph below shows an object in space that has an icy core with a tail of gas and dust extending for millions of kilometers.



The object is most likely

- (1) a star      (3) a moon  
(2) an asteroid      (4) a comet

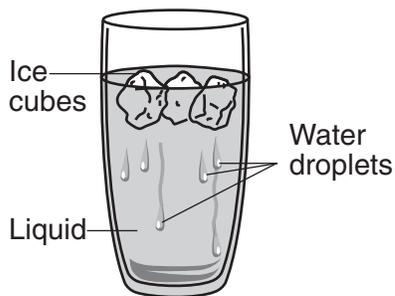
- 34 Scientists have discovered fossils of the same organisms in many different parts of the world. These fossils provide evidence that
- (1) the continents were once joined together
  - (2) most life-forms that existed in the past are still present today
  - (3) most of Earth's surface was once covered by molten rock
  - (4) rocks have been transformed from one type to another

- 35 The amount of which greenhouse gas in the air will increase the most if large forests are cut down to be used for building materials without planting new trees in their place?
- (1) ozone
  - (2) methane
  - (3) water vapor
  - (4) carbon dioxide

- 36 Because copper is a metal, it is
- (1) liquid at room temperature
  - (2) nonreactive with other substances
  - (3) a poor conductor of electricity
  - (4) a good conductor of heat

- 37 A student placed a rock in a graduated cylinder containing water, causing the water level in the cylinder to increase by 20 mL. This increase represents the rock's
- (1) mass
  - (2) volume
  - (3) solubility
  - (4) temperature

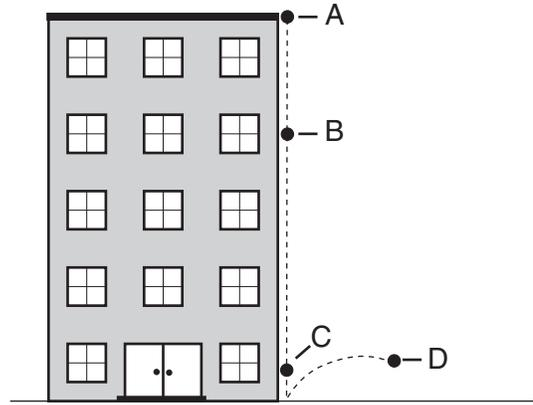
- 38 The diagram below shows a glass containing a liquid and ice cubes.



Which process causes water droplets to form on the outside of the glass?

- (1) evaporation
- (2) condensation
- (3) freezing
- (4) melting

- 39 A ball is dropped from the roof of a building. Points A, B, C, and D in the diagram below represent positions of the ball as it falls.



At which position will the ball have the greatest kinetic energy?

- (1) A
- (2) B
- (3) C
- (4) D

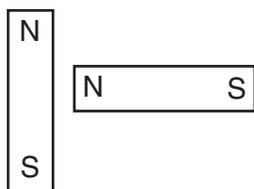
- 40 People often wear sunglasses in polar regions because most of the sunlight that strikes a snow-covered surface is
- (1) reflected
  - (2) absorbed
  - (3) refracted
  - (4) transmitted

- 41 Which form of energy is produced when a rubber band vibrates?
- (1) chemical
  - (2) light
  - (3) electrical
  - (4) sound

- 42 A battery-powered cart pulls an 800-gram load across the floor. If the load were reduced to 400 grams, and the force used to move the cart remained the same, the cart would
- (1) move slower
  - (2) move faster
  - (3) move at the same speed
  - (4) stop moving

- 43 Which type of energy is transferred from one object to another by simple machines?
- (1) mechanical
  - (2) chemical
  - (3) nuclear
  - (4) electrical

44 Which position of two magnets results in the greatest attraction between the magnets?



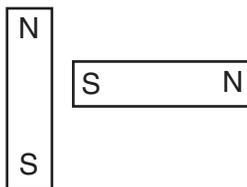
(1)



(3)

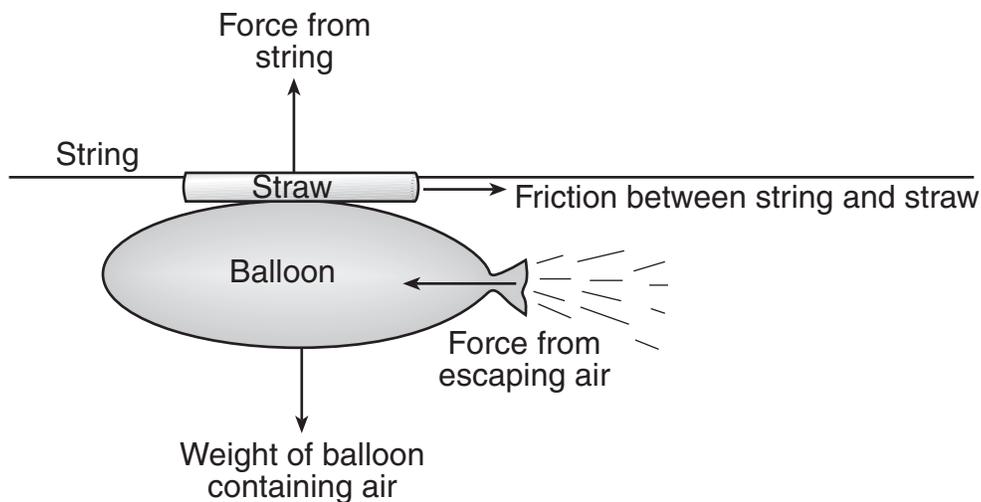


(2)



(4)

45 The diagram below shows an inflated balloon attached to a straw that is moving along a string. Air is escaping from the open end of the inflated balloon. Some forces that are acting on the straw are shown by the four labeled arrows.



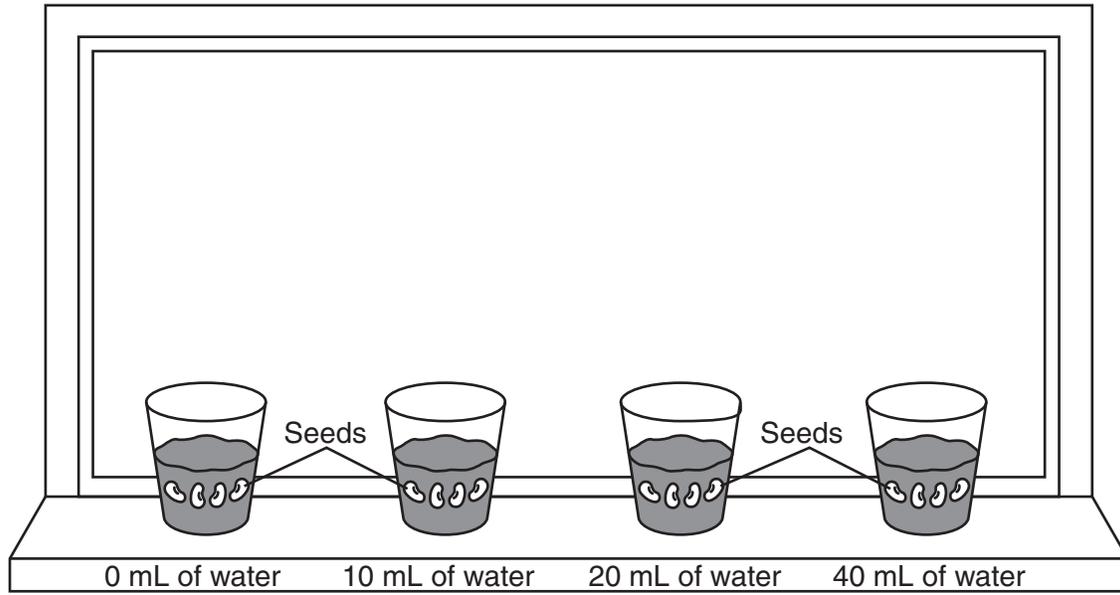
What causes the balloon to move along the string?

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| (1) force from string                 | (3) force from escaping air          |
| (2) friction between string and straw | (4) weight of balloon containing air |

## Part II

*Directions* (46–85): Record your answers in the space provided below each question.

Base your answers to questions 46 and 47 on the diagram below and on your knowledge of science. The diagram shows a controlled experiment designed to test how much time it takes for seeds to germinate under four different conditions. Four bean seeds were placed in each of four pots. Each pot contained 100 cubic centimeters ( $\text{cm}^3$ ) of soil. All four pots were placed on the same sunny windowsill. A different amount of water was placed in each pot.



46 Identify the independent (manipulated) variable in this experiment. [1]

\_\_\_\_\_

47 Identify *two* conditions shown in the diagram that are held constant in all four pots. [1]

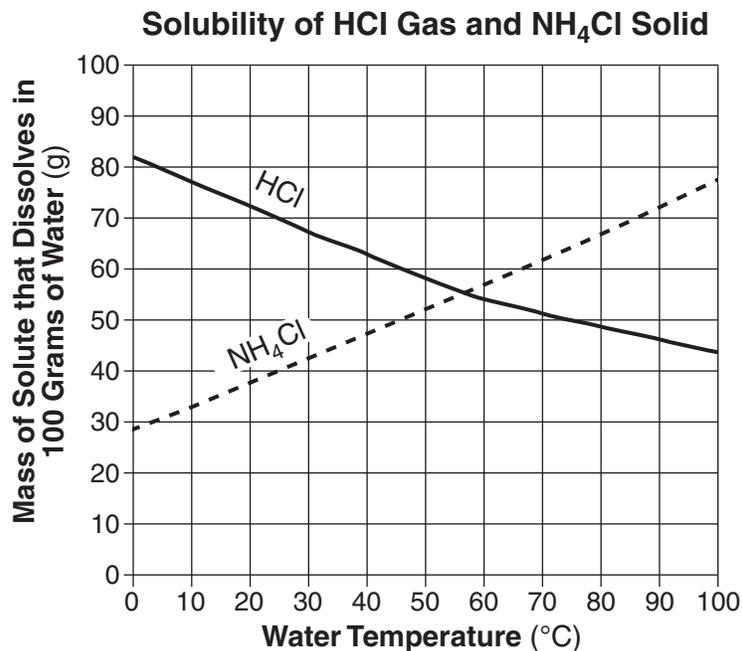
(1) \_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_



50 The graph below shows the mass of hydrogen chloride gas (HCl) and solid ammonium chloride (NH<sub>4</sub>Cl) that dissolves in 100 grams (g) of water as the temperature of the water changes.



Determine the number of grams of NH<sub>4</sub>Cl that will dissolve in 100 grams of water at 25°C. [1]

\_\_\_\_\_ grams

Base your answers to questions 51 and 52 on the information and data table below and on your knowledge of science. The data table lists the average cumulative loss in thickness of glaciers around the world from 1980 to 2005.

### Earth's Shrinking Glaciers

Scientists measure the thickness of glaciers to determine the effect that warmer temperatures have on Earth. During the last few decades, glaciers around the world have decreased in size. The data table lists the average cumulative loss in the thickness of glaciers in nine regions of Earth for the years shown. Cumulative means that the amount of loss for each year is added to all the previous years. Glacial thickness is measured in meters (m).

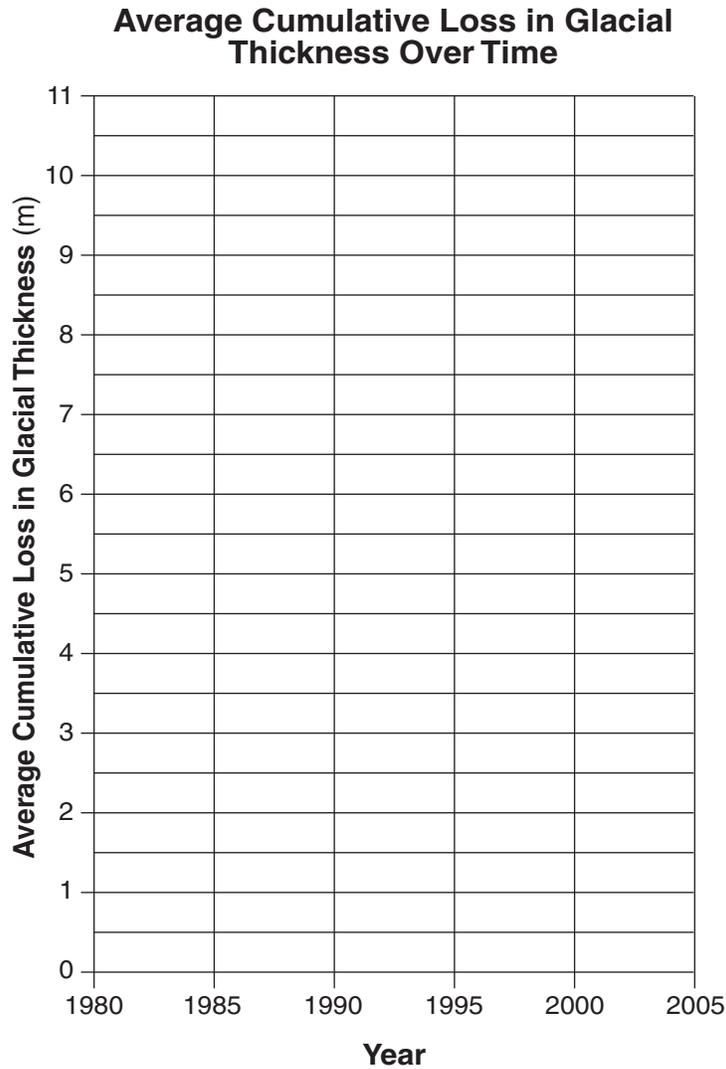
**Data Table**

Year	Average Cumulative Loss in Glacial Thickness (m)
1980	0
1985	1.2
1990	2.3
1995	4.2
2000	6.5
2005	10.8

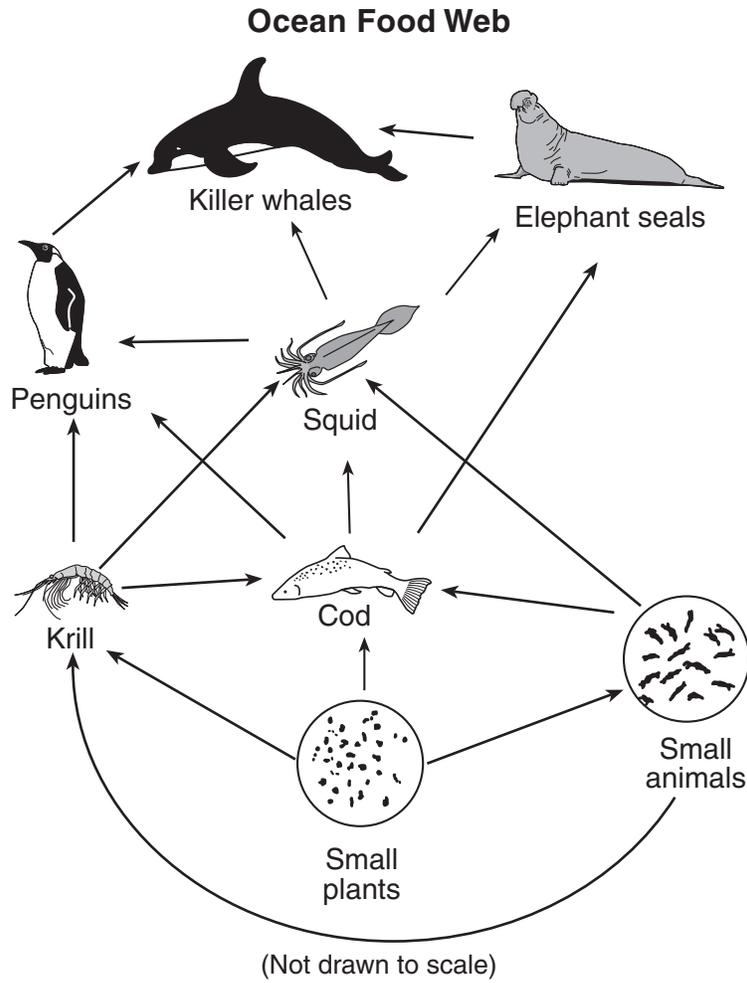
51 During which 5-year interval shown in the data table did glacial thickness in meters change the most? [1]

Between \_\_\_\_\_ and \_\_\_\_\_

52 On the grid below, use an **X** to plot the average cumulative loss in glacial thickness for each year shown in the data table. Connect the **X**s with a line. [1]



Base your answers to questions 53 and 54 on the ocean food web below and on your knowledge of science.



53 Explain why the number of squid might change if there were a significant *decrease* in the number of cod. [1]

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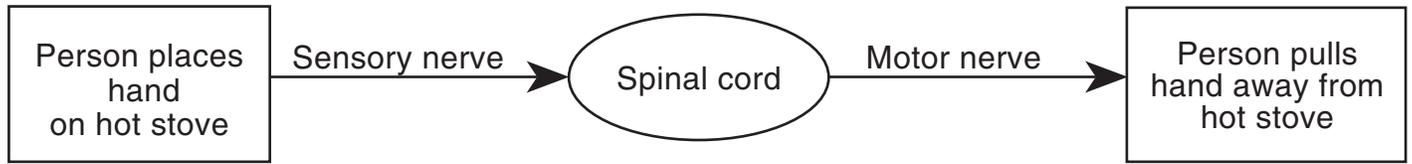
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54 Identify *one* omnivore in this food web. [1]

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Base your answers to questions 55 and 56 on the flowchart below and on your knowledge of science. The flowchart illustrates how the human body usually reacts to a harmful situation.



55 Identify the cause and the effect in this flowchart. [1]

Cause: \_\_\_\_\_

Effect: \_\_\_\_\_

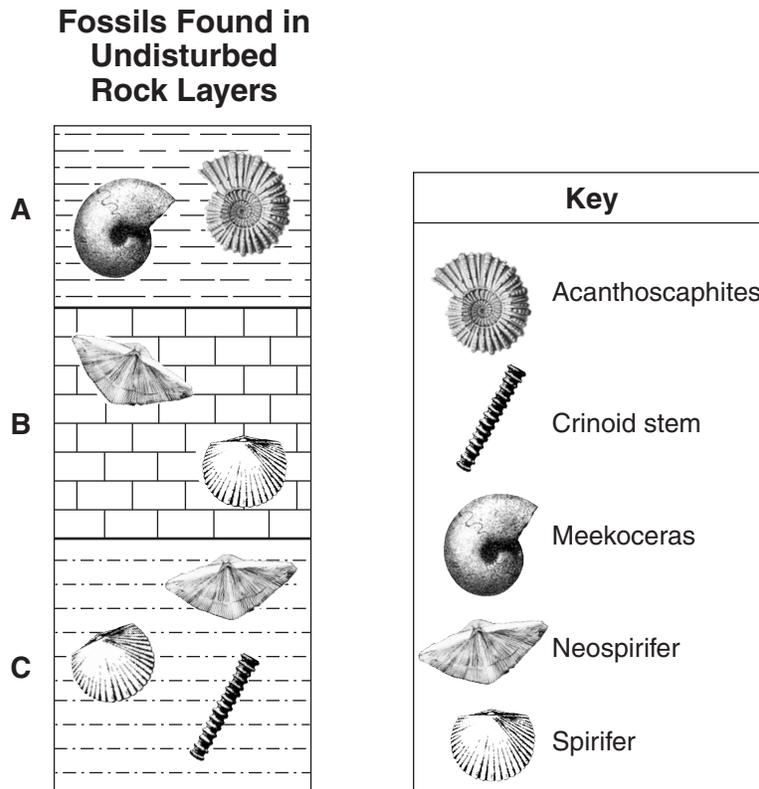
56 Explain the purpose of a quick body response like pulling a hand away from a hot stove. [1]

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Base your answers to questions 57 through 59 on the diagram below and on your knowledge of science. The diagram shows fossils found in three rock layers, A, B, and C. The layers have *not* been overturned. A key is provided to identify the fossils.



57 Which *two* fossils are found in two different rock layers? [1]

\_\_\_\_\_ and \_\_\_\_\_

58 Explain why the *Meekoceras* fossils are considered to be one of the youngest fossils. [1]

\_\_\_\_\_  
\_\_\_\_\_

59 Circle the class (type) of rock that most likely includes rock layers A, B, and C. [1]

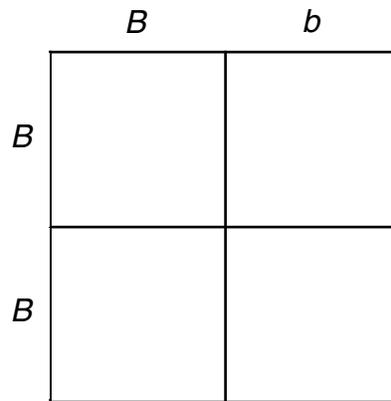
Circle one:      igneous      metamorphic      sedimentary

\_\_\_\_\_

Base your answers to questions 60 and 61 on the information below and on your knowledge of science.

In rabbits, the gene for brown fur ( $B$ ) is dominant over the gene for white fur ( $b$ ).

60 Complete the Punnett square below that shows a cross between two brown rabbits whose genetic makeups are  $Bb$  and  $BB$ . [1]

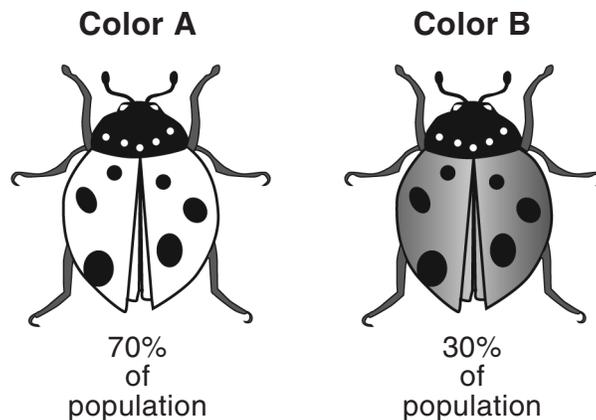


61 What are the genetic makeups of *two* parent rabbits whose offspring can have only white fur? [1]

\_\_\_\_\_ × \_\_\_\_\_  
(Parent 1) (Parent 2)

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62 The diagram below represents a species of beetle (ladybug) with two different body colors labeled A and B. These beetles live on trees and are eaten by birds. The percentage of each body color in the population of this species is indicated. The habitat of this beetle population is a group of trees with light-colored bark.



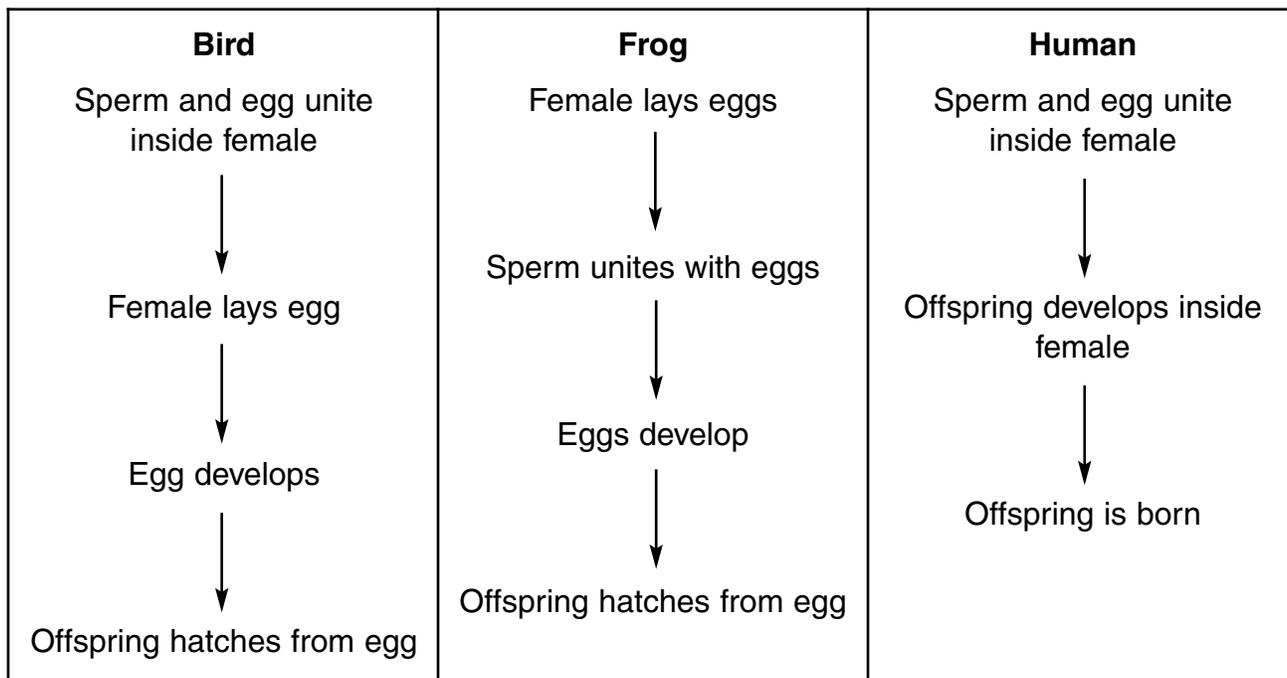
Based on the information provided, explain why the beetle population in this habitat contains a higher percentage of beetles with body color A. [1]

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Base your answers to questions 63 through 65 on the chart below and on your knowledge of science. The chart describes typical fertilization and development in three different animals.

### Fertilization and Development



63 Which animals in the chart undergo internal fertilization? [1]

\_\_\_\_\_ and \_\_\_\_\_

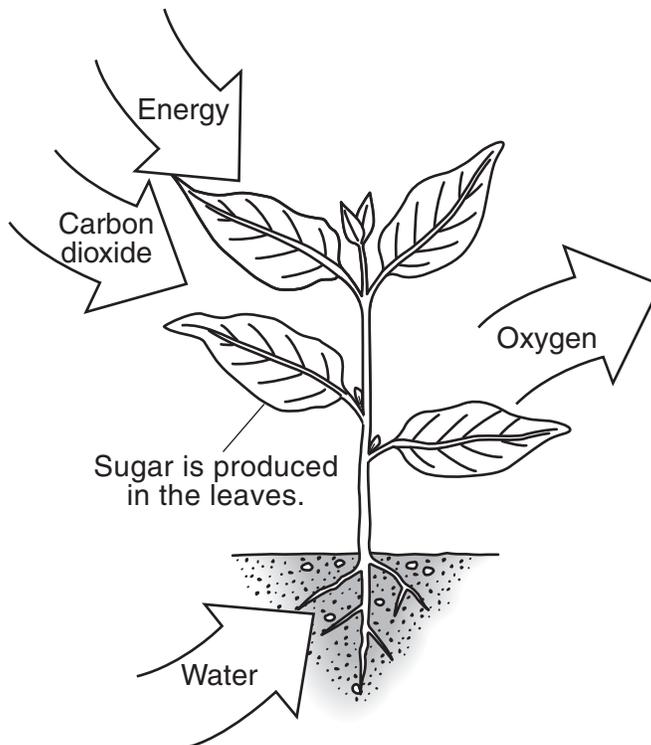
64 Which animals in the chart develop externally? [1]

\_\_\_\_\_ and \_\_\_\_\_

65 Why do human egg and sperm cells have only 23 chromosomes when human body cells have 46 chromosomes? [1]

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Base your answers to questions 66 and 67 on the diagram below and on your knowledge of science. The diagram represents a plant carrying out photosynthesis.



66 Identify the source of energy for photosynthesis. [1]

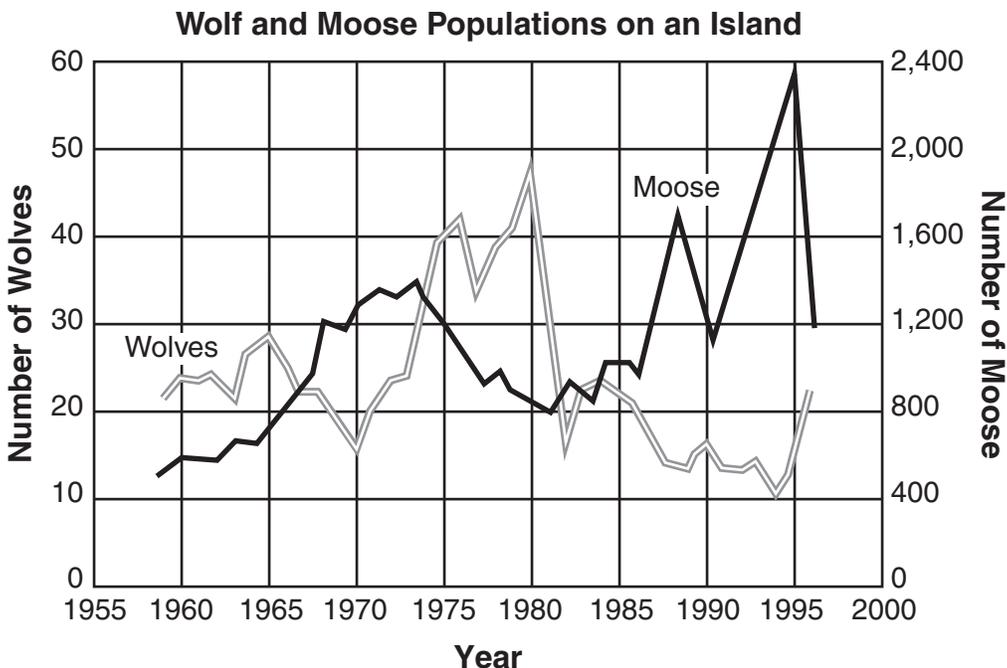
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67 State *one* way the plant uses the sugar that is produced in the leaves. [1]

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Base your answers to questions 68 and 69 on the graph below and on your knowledge of science. The graph shows wolf (predator) and moose (prey) populations on an island over a period of many years.



68 Describe the changes in the wolf population from 1965 to 1970, and from 1970 to 1975. [1]

1965 to 1970: \_\_\_\_\_

1970 to 1975: \_\_\_\_\_

69 Explain how the graph shows that there is a predator/prey relationship between the wolves and moose on this island. [1]

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Base your answers to questions 70 and 71 on the map below and on your knowledge of science. The map represents the state of California. The San Andreas Fault and several associated faults have been labeled, as well as seven major cities.



70 Which labeled city has the greatest risk of damage from an earthquake occurring along the San Andreas Fault? [1]

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71 Describe *one* action, other than moving to another location, that people living in California can take to prepare for a future earthquake. [1]

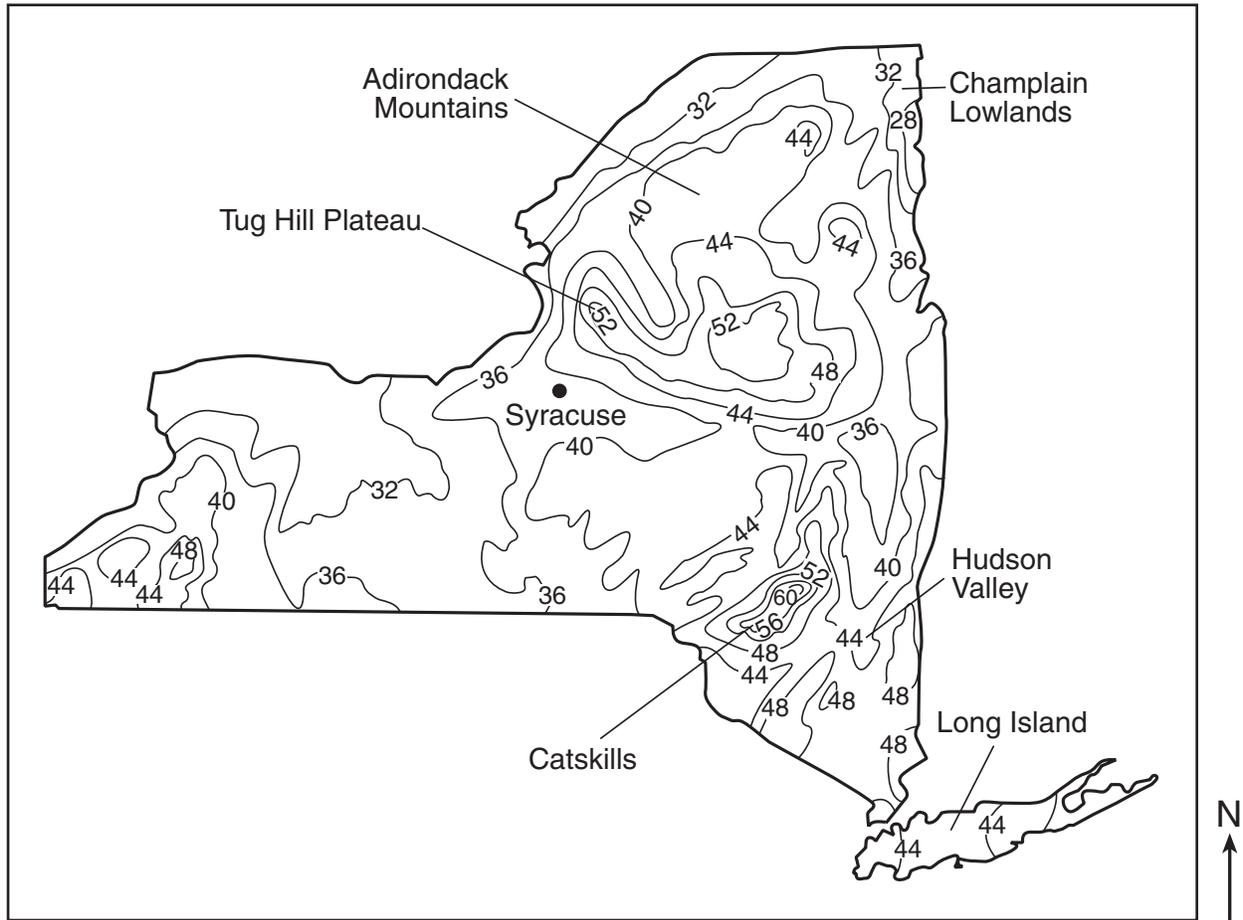
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Base your answers to questions 72 and 73 on the New York State map and information below and on your knowledge of science. The isolines on the map connect locations with the same average yearly precipitation, in inches. Six regions in New York State are labeled. The location of the city of Syracuse is shown.

**Average Yearly Precipitation in Inches**



72 Which labeled region receives the highest average yearly precipitation? [1]

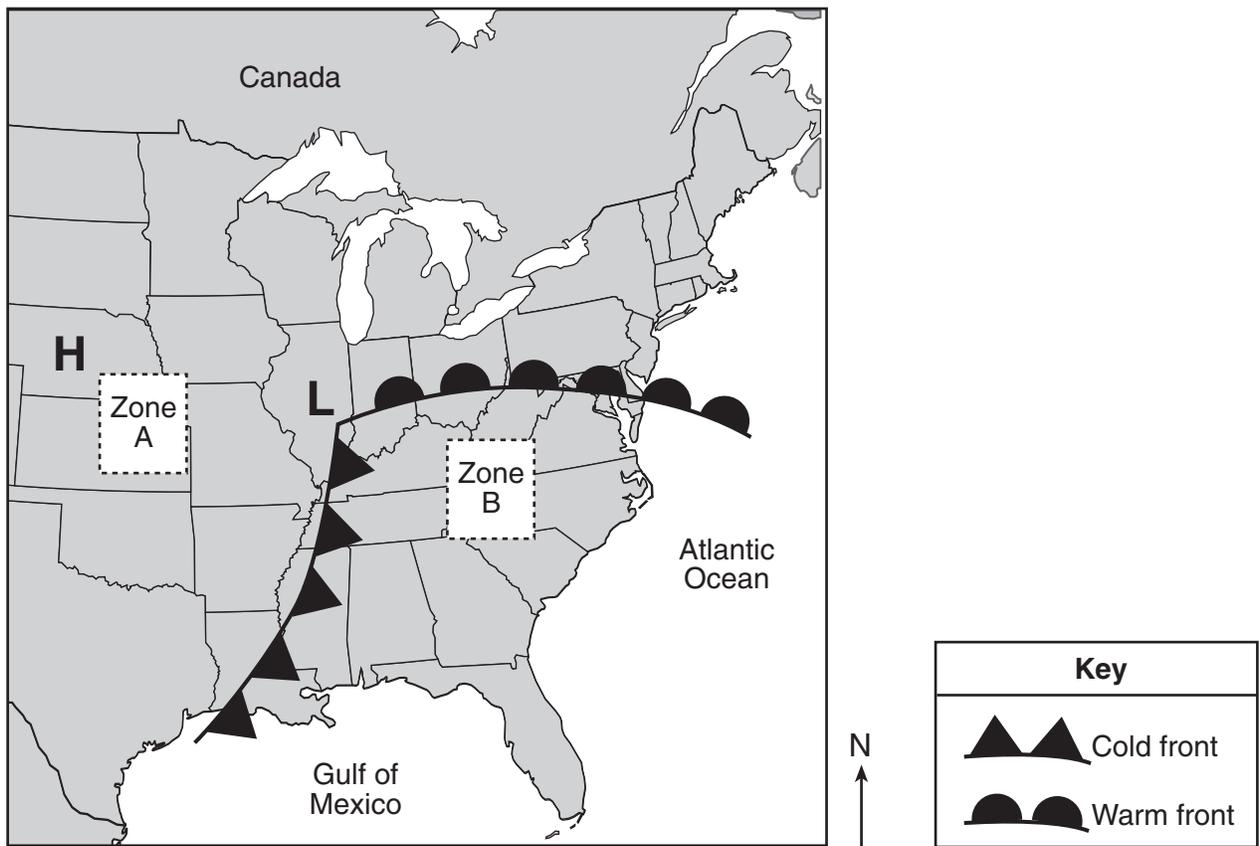
\_\_\_\_\_

73 What is the average yearly precipitation for the city of Syracuse? [1]

\_\_\_\_\_ inches

\_\_\_\_\_

Base your answers to questions 74 through 76 on the map below, which represents the center of a high-pressure system (**H**) and the center of a low-pressure system (**L**) over part of the United States. A warm front and a cold front associated with the low-pressure system are shown. Two zones on the map are labeled A and B.



74 Explain why the air mass centered over zone A is colder and drier than the air mass centered over zone B. [1]

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75 In which compass direction will the center of the low-pressure system most likely move during the next 24 hours? [1]

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76 Describe *one* weather condition that would most likely occur along both fronts. [1]

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Base your answers to questions 77 and 78 on the information below and on your knowledge of science.

The data table below shows three properties of six different-sized samples of quartz sand. One property of the samples is labeled *X*. A student used the data for mass and property *X* to calculate the density of each sand sample.

**Data Table**

<b>Sand Sample</b>	<b>Mass (g)</b>	<b>Property X (cm<sup>3</sup>)</b>	<b>Density (g/cm<sup>3</sup>)</b>
1	10	3.8	2.6
2	12	4.6	2.5
3	15	5.6	2.7
4	18	6.9	2.6
5	20	8.0	2.5
6	22	8.5	2.6

77 What property of the samples is represented by *X*? [1]

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78 All of the quartz samples should have had the same density. State *one* error the student may have made during the experiment. [1]

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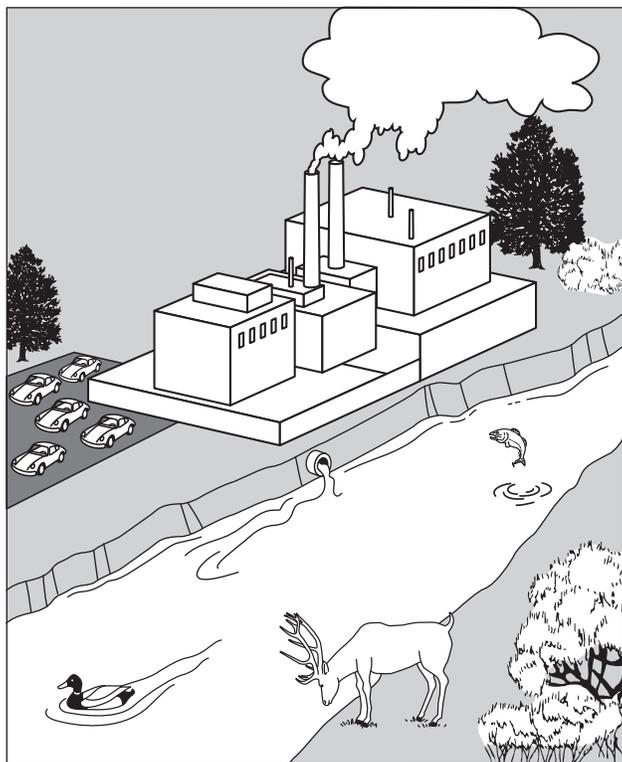
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79 Selective breeding is a process used by some farmers. Complete the chart below by reading the description and then circling either yes, if it is an example of selective breeding, or no, if it is *not* an example of selective breeding. [1]

Description	Selective Breeding
A farmer develops seeds that are resistant to a fungal disease by crossing two disease-resistant plants.	<p>Yes</p> <p>No</p>
A farmer found that if the temperature of the barn was kept 5 degrees warmer, the cows in the barn produced more milk.	<p>Yes</p> <p>No</p>
A farmer planted corn seeds in the field two weeks earlier than usual. The earlier start yielded more corn.	<p>Yes</p> <p>No</p>
A farmer mated his cattle with larger cattle. The offspring weighed more and provided more meat.	<p>Yes</p> <p>No</p>

Base your answers to questions 80 through 82 on the diagram below and on your knowledge of science. The diagram shows a power station that burns coal (a fossil fuel) to make electricity and the area around it.



(Not drawn to scale)

80 Explain why coal and other fossil fuels are considered *nonrenewable* energy sources. [1]

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81 State *one disadvantage* of burning coal, other than coal is a *nonrenewable* energy source. [1]

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82 State *one* alternative to burning fossil fuels in order to produce electricity. [1]

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83 The chart below lists samples of three materials. Classify *each* sample in the chart as an element, a compound, or a mixture by circling the correct classification. [1]

Sample	Classification (circle one)		
noble gas	element	compound	mixture
salt dissolved in water	element	compound	mixture
hydrogen chemically combined with oxygen	element	compound	mixture

Base your answers to questions 84 and 85 on the data table below and on your knowledge of science. The data table lists the amount of energy input, amount of heat produced by friction, and amount of energy output for each of four machines, *A*, *B*, *C*, and *D*. Both energy and heat are measured in units called joules. The heat produced by friction for machine *D* has been left blank.

**Data Table**

Machine	Energy Input (joules)	Heat Produced By Friction (joules)	Energy Output (joules)
A	100	30	70
B	100	10	90
C	100	25	75
D	100		60

84 How much heat was produced by friction in machine *D*? [1]

\_\_\_\_\_ joules

85 Explain how the data table shows that machine *B* is the most efficient. [1]

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# GRADE 8 INTERMEDIATE-LEVEL SCIENCE

## For Teacher Use Only

### Part II Credits

Question	Maximum Credit	Credit Allowed
46	1	
47	1	
48	1	
49	1	
50	1	
51	1	
52	1	
53	1	
54	1	
55	1	
56	1	
57	1	
58	1	
59	1	
60	1	
61	1	
62	1	
63	1	
64	1	
65	1	
66	1	
67	1	
68	1	
69	1	
70	1	
71	1	
72	1	
73	1	
74	1	
75	1	
76	1	
77	1	
78	1	
79	1	
80	1	
81	1	
82	1	
83	1	
84	1	
85	1	
<b>Total</b>	<b>40</b>	

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